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ELECTRO-OXIDATIVE CONVERSION AND PROCESS INTENSIFICATION OF BIOMASS DERIVED 5-HYDROXYMETHYLFURFURAL INTO 2,5-FURANDICARBOXYLIC ACID

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2,5-Furandicarboxylic acid (FDCA) has been recognized among the top ten bio-based chemical feedstocks owing to its use as a precursor in the synthesis of 100% natural, biodegradable and 100% recyclable polymer-plastic PEF (polyethylene furanoate) that will potentially replace the PET (Polyethylene terephthalate). FDCA can be synthesized from easily available and biomass derived 5-hydroxymethylfurfural (HMF) using heterogeneous phase catalysts or electrochemical route (**Figure**). Out of these two processes, the electrochemical route is least explored but it is more viable for the selective formation of FDCA, the selectivity of which can be tuned by electrode potential and by the choice of electrocatalytic material, pH, electrolyte nature, operating temperature and pressure. At DTU-Energy, we have expertise on electrochemical systems operating under ambient pressure and under controlled high-temperature and high-pressure environment. Here we show our electrochemical studies for the HMF oxidation on polycrystalline Au, Pt, Cu and Ni foils, Ti-plate and surface-modified Ti-plate with a RuO_2 film deposited on it. Initial data suggest that polycrystalline gold and platinum surfaces exhibit the lowest overpotential for the HFM (0.5 wt %) oxidation in alkaline media. After product analysis using online HPLC to determine the yield and selectivity, next step is to investigate HMF electrolysis using a wide range of electrocatalytic materials at varying pH under high temperature and high pressure conditions for process intensification.